LIVING WITH FIRE

A GUIDE FOR THE HOMEOWNER

LAKE TAHOE BASIN

Lake Tahoe Basin's Gondola Fire - 2002

Living With Fire

. . . in the Lake Tahoe Basin

Fire is Natural to Tahoe's Environment

Low-intensity Fire

Some Tahoe Basin plants, such as Jeffrey and ponderosa pine, require the conditions present after a fire to germinate and grow.

Fire has been a natural part of Tahoe's environment for thousands of years. These historic fires were frequent, of low intensity, and a major influence on the appearance of Tahoe's forests. Beginning in the 1870s, Tahoe's forests and the occurrence of fire experienced some dramatic changes.

Much of the Lake Tahoe Basin is considered a "fire environment." It contains flammable vegetation and a climate to support fire. Fire is a natural process in the Lake Tahoe Basin and many of the plants growing here evolved in the presence of frequent fires. In fact, it is unnatural for fire to be absent for very long in many areas of the Lake Tahoe Basin.

The map presented at right (Page 3) shows the occurrence of fire in the Tahoe Basin prior to European-American settlement. During this period much of the Lake Tahoe Basin burned, on average, every five to 18 years. These areas are shown as pale yellow on the map. Because these areas burned so often, large amounts of wildfire fuels could not build up. Consequently, these fires were usually of low intensity.

The frequency and intensity of fire influences the type and health of Tahoe's forests. The frequent, low-intensity fires prior to European-American settlement created an open, park-like forest. The photo at the bottom left corner is of Emerald Bay, taken in the 1890s. Experts feel this is a good example of what Tahoe's original (prior to European-American settlement) forest looked like.

The low-intensity fires thinned out young trees and shrubs and also reduced the buildup of deep layers of pine needles, leaves, and twigs. The older, thick-barked trees survived this type of fire. As a result, the forest was dominated by patches of large, mature trees with a sparse understory.

This is no longer the case for Tahoe's forest.

Original Forest

Prior to 1870, low-intensity fires burned routinely in the Tahoe Basin. These fires created an open, patchy forest dominated by large trees. The raging, high-intensity wildfires portrayed in today's newspaper headlines were uncommon.

Logging Era

During the 1870s to 1890s, much of the Tahoe Basin was logged. E.B. Scott in "The Saga of Lake Tahoe" states, "By the fall of 1897 nothing remained at Incline but stripped forest land."

The New Forest

A new forest establishes in the aftermath of the logging era. But now, fire has been effectively eliminated as a natural influence. Without frequent, low-intensity fires to thin dense stands of trees, the forest becomes overcrowded.

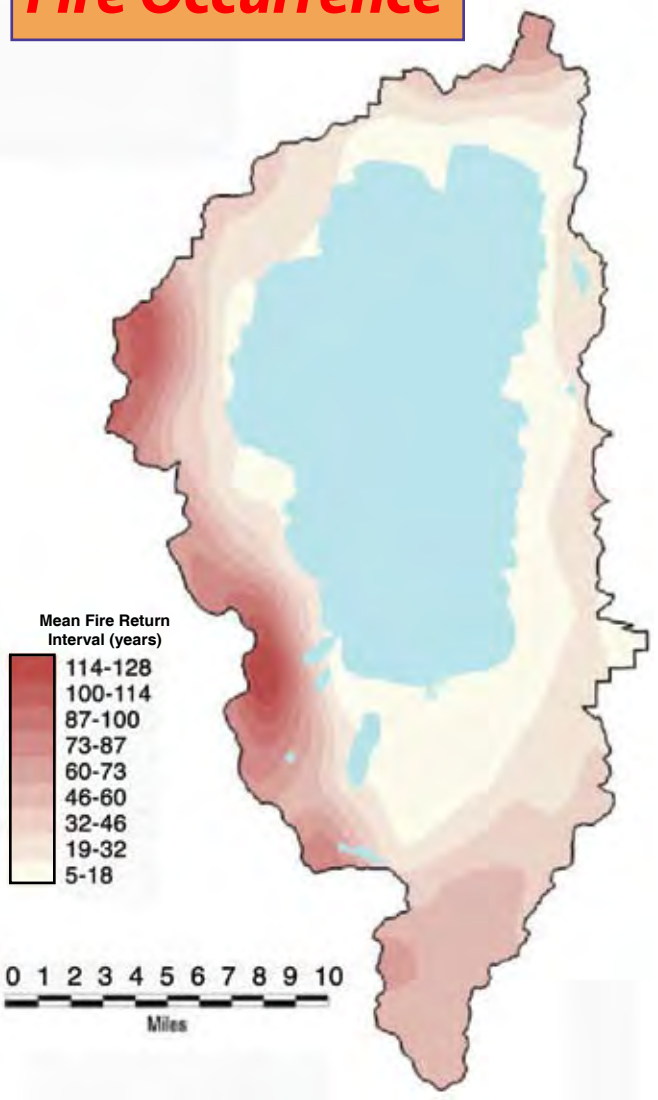
1870 1900 2000

Tahoe's Forest Timeline

Emerald Bay - 1890s

Emerald Bay - 1990s

Tahoe's Historic Fire Occurrence



Source: Lake Tahoe Watershed Assessment: Volume I. General Technical Report PSW GTR-175. Pacific Southwest Research Station. Forest Service, USDA.

Tahoe's Current Forest and Fire Threat...

Today's forest is much different than the forest that existed prior to 1870. The low elevation mixed conifer forest of the Lake Tahoe Basin, where most homes are located, has four times more under-story trees today than it did prior to 1870. In addition, there has been a substantial increase in the amount of shrubs present.

The photographs of Emerald Bay at the bottom Page 2 are of the same location, but taken 100 years apart. Notice that large trees in the 1890s photograph are still present in the more recent photograph. However, there has been a considerable increase in the density of trees and shrubs in the understory. A major cause of the increase in woody plants has been the lack of frequent, low-intensity fires. With European-American settlement, these fires were effectively suppressed.

Under these unnatural conditions, uncontrollable, high-intensity fires are much more likely. The Martis and Gondola Fires are recent examples of these types of fires in the Tahoe area. Furthermore, the forest is less healthy and more susceptible to disease and insects, particularly during drought.

Unfortunately, given Tahoe's current conditions, homes and lives are at risk.

Dense stands of trees are more likely to be stressed during drought and are often more vulnerable to disease and insects.


THE MARTIS FIRE | IN PERSPECTIVE

Tahoe threat looms

Hot, dry weather puts basin at risk for fire

JUNE 21 | Smoke settles over ridges during the Martis Fire, which came within about 2 miles of Incline Village.

Experts call this year's danger unprecedented

Fire danger around Lake Tahoe

ABOUT THIS SERIES

Newspaper stories, such as this Reno Gazette-Journal article, warn of the potential for a catastropic wildfire in the Lake Tahoe Basin.

Tahoe Today...

Today's Forest

Tahoe's current forest is typically thick with trees, brush, and dead vegetation. In many areas, fire has been absent for over a hundred years. As a result, there has been a great buildup of wildfire fuel. Homes have now been added to Tahoe's wildfire fuel mix. The likelihood for uncontrollable, high-intensity wildfire that impacts watersheds, destroys neighborhoods, and takes human life is high in many areas of the Lake Tahoe Basin.

Tahoe homeowners need to prepare for wildfire...

Fact: Despite our best prevention efforts, the Lake Tahoe Basin has one of the highest wildfire ignition rates in the Sierra Nevada.

Fact: The Lake Tahoe Basin's forests have an unprecedented amount of fuel available for burning.

Fact: Many Lake Tahoe Basin homes, neighborhoods, and communities are not prepared to survive a wildfire.

Living in a High Wildfire Hazard Area

The potential for loss of human life and property due to wildfire in the Lake Tahoe Basin is growing. In response, local, state, federal, private, and nonprofit organizations have banded together to create *Living With Fire*, a wildfire threat reduction program for homeowners.

The *Living With Fire* program is not about fire prevention. Its purpose is to teach people how to live more safely with the threat of wildfire. For the Lake Tahoe Basin, it is not a question of "if" wildfire will occur, but "when."

The Lake Tahoe Basin's Gondola Fire threatened hundreds of Kingsbury homes.

Photo courtesy of Nevada Appeal

Who Wins, Who Loses...

Why do some houses survive a wildfire, while others are destroyed? Research findings prove that house survival during wildfire is not random, miraculous, or "dumb luck." Rather, it is how the house is built, the characteristics of the adjacent vegetation and other fuels, and routine maintenance that often determine which homes burn and which survive. These types of actions are called "pre-fire" activities. Pre-fire activities are actions completed before a wildfire occurs which improve the survivability of people and the home. The "winners" will be the people who implement pre-fire activities.

The homeowner is the most important person in preventing a house from being destroyed by wildfire. It is the actions that a homeowner takes before a wildfire occurs that are critical.

HUMAN BEHAVIOR IS JUST AS IMPORTANT AS FIRE BEHAVIOR IN SAVING YOUR HOME!

BEFORE THE FIRE

DURING THE FIRE

AFTER THE FIRE

Prior to the fire, this homeowner changed the roof material from wood shakes to fire-resistant tiles and reduced the amount of flammable vegetation surrounding the home. These pre-fire activities helped this house survive the fire.

Wildfire will threaten your house in three ways…

Photo courtesy of Ben Hammack

CONTACT BY FLAMES

This type of threat occurs when vegetation and other fuels burning near the house produce flames that come in contact with the home and ignite it. Often, it happens when fire burns through a uniform layer of vegetation right up to the house. Direct contact by flames is probably what most homeowners visualize when they think of a house burning during wildfire.

Photo courtesy of Ben Hammack

RADIATED HEAT

Radiated heat melted the vinyl siding on this house. Flames never came in contact with it. Radiated heat is produced by invisible electromagnetic waves that travel out in all directions from a flame. When a house receives enough radiated heat for a sufficient amount of time, it will ignite. Sometimes radiated heat can burst windows and allow burning embers to enter the house.

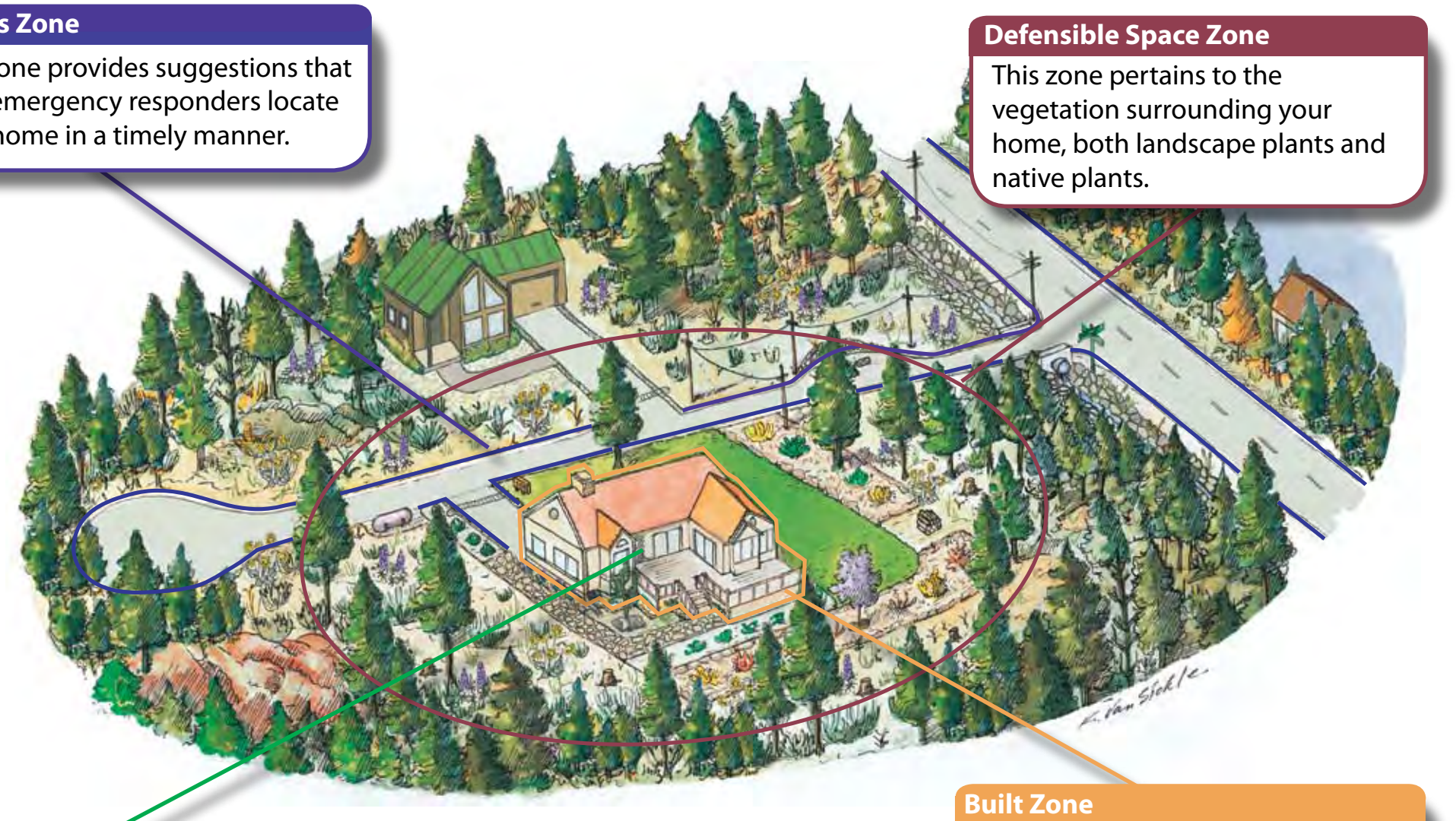
Photo courtesy of Mike Dannenberg

FLYING EMBERS

More houses burn due to flying embers than any other reason. If fire conditions are right, embers can be lofted high into the air and transported more than a mile. Burning embers can also be carried by wind and fire whirls. If these burning embers land in easily ignitable materials, a new fire can start.

What can homeowners do to reduce the wildfire threat?

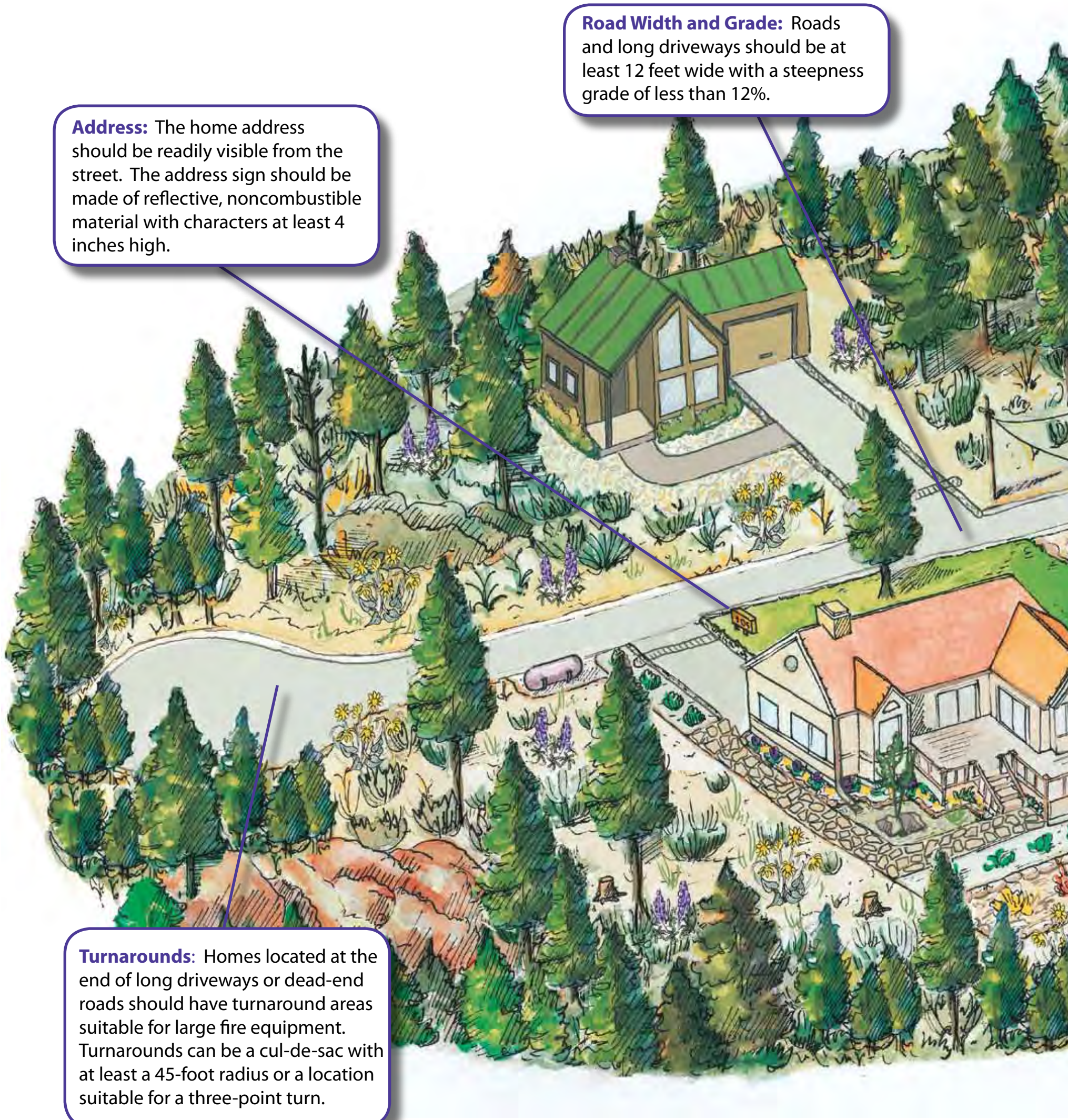
The Living With Fire wildfire threat reduction recommendations are presented according to four zones...



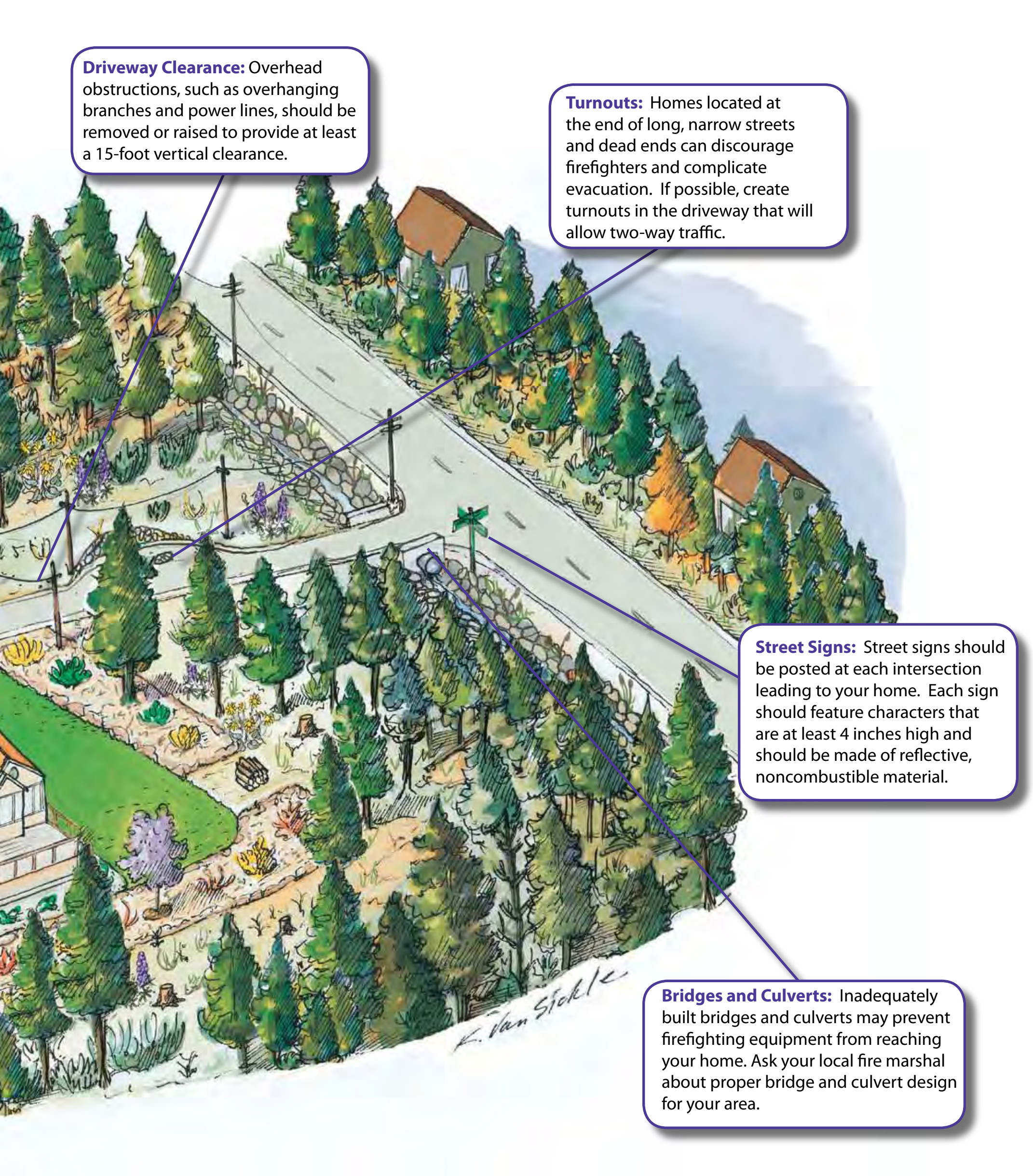
Access Zone

Road Width and Grade: Roads and long driveways should be at least 12 feet wide with a steepness grade of less than 12%.

Address: The home address should be readily visible from the street. The address sign should be made of reflective, noncombustible material with characters at least 4 inches high.



Turnarounds: Homes located at the end of long driveways or dead-end roads should have turnaround areas suitable for large fire equipment. Turnarounds can be a cul-de-sac with at least a 45-foot radius or a location suitable for a three-point turn.



Driveway Clearance: Overhead obstructions, such as overhanging branches and power lines, should be removed or raised to provide at least a 15-foot vertical clearance.

Turnouts: Homes located at the end of long, narrow streets and dead ends can discourage firefighters and complicate evacuation. If possible, create turnouts in the driveway that will allow two-way traffic.

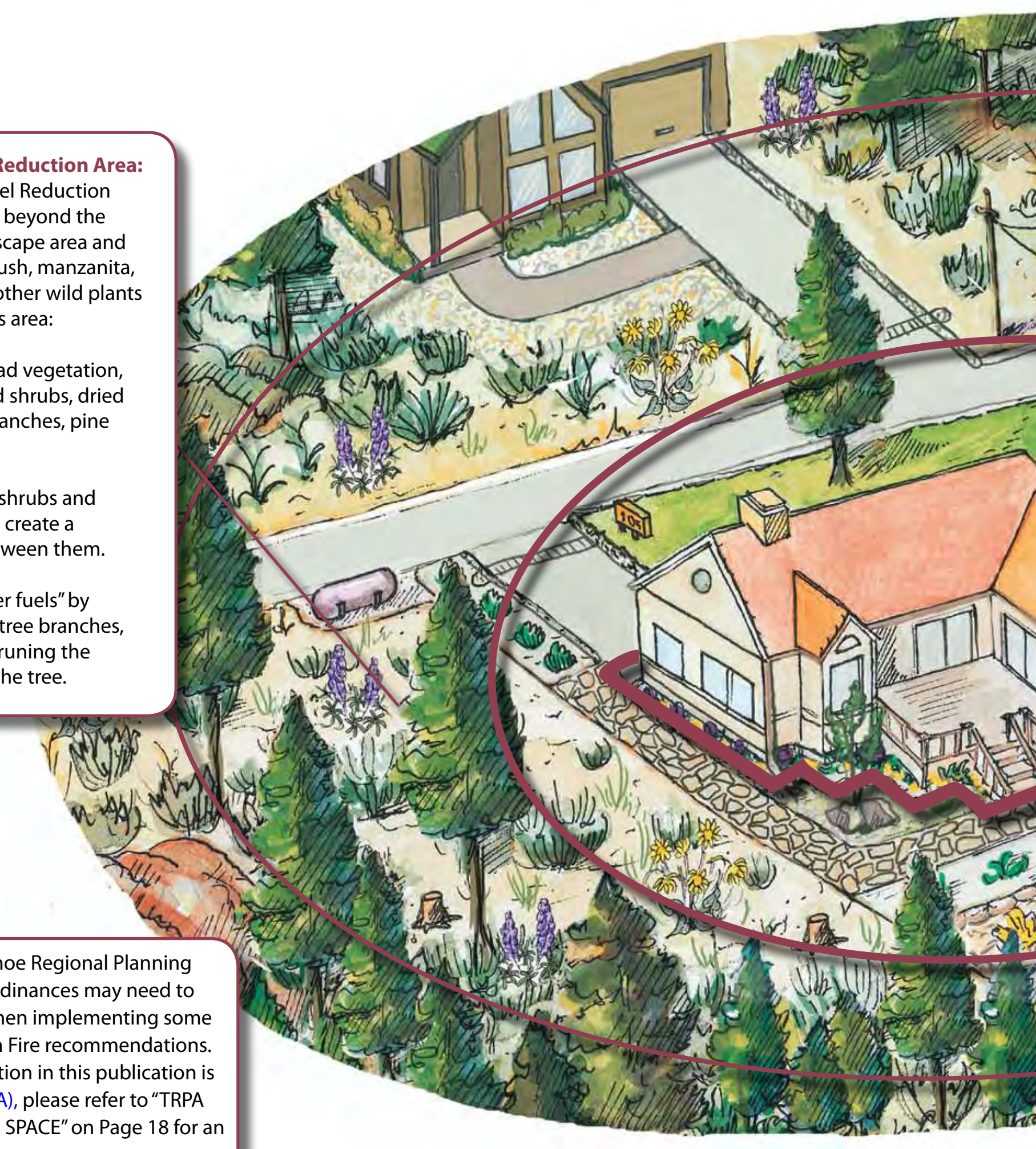
Street Signs: Street signs should be posted at each intersection leading to your home. Each sign should feature characters that are at least 4 inches high and should be made of reflective, noncombustible material.

Bridges and Culverts: Inadequately built bridges and culverts may prevent firefighting equipment from reaching your home. Ask your local fire marshal about proper bridge and culvert design for your area.

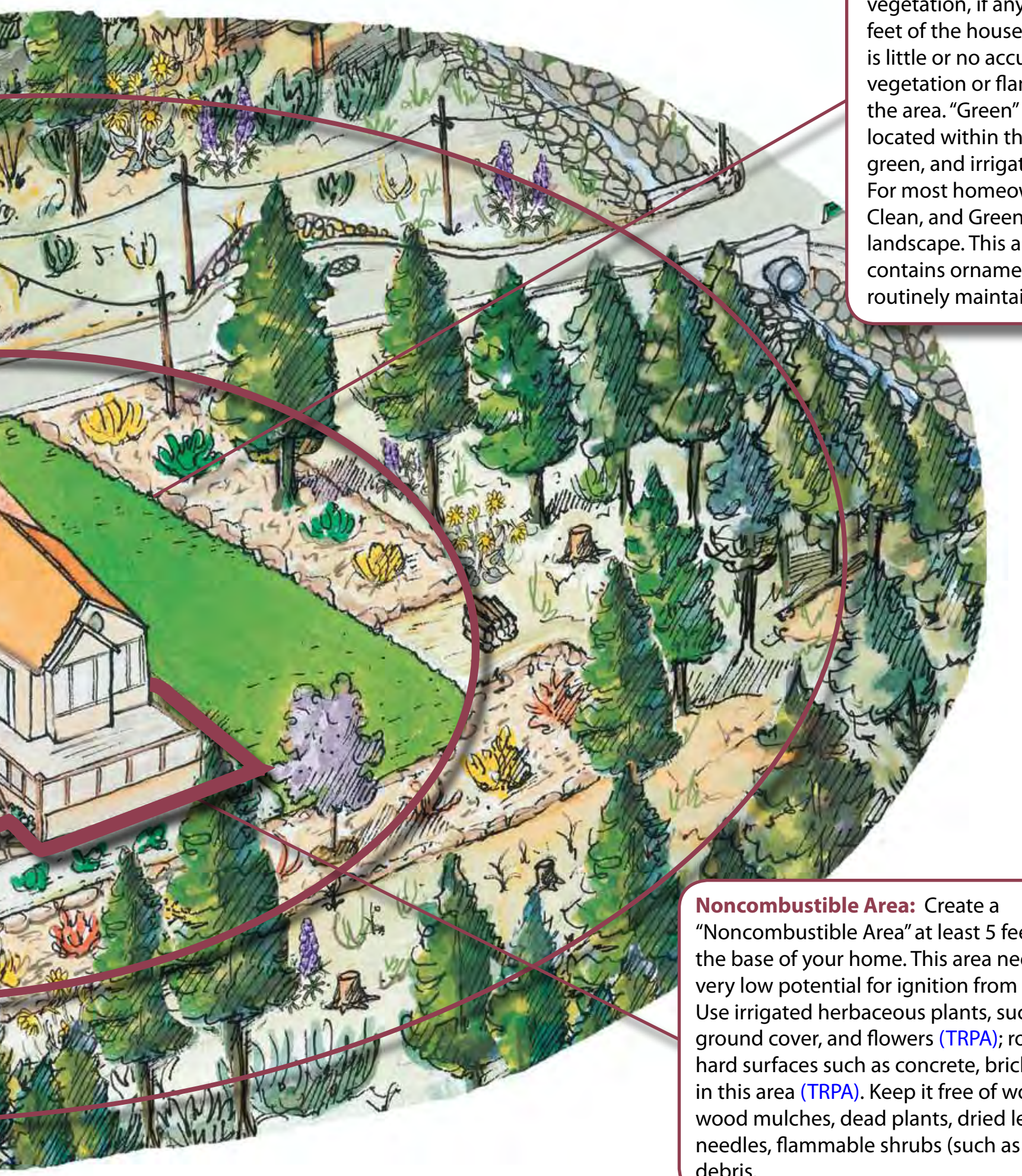
Defensible Space Zone

Wildland Fuel Reduction Area: The Wildland Fuel Reduction Area usually lies beyond the residential landscape area and is where sagebrush, manzanita, pine trees, and other wild plants grow. Within this area:

- Remove all dead vegetation, including dead shrubs, dried grass, fallen branches, pine needles, etc.
- Thin out thick shrubs and trees (TRPA) to create a separation between them.
- Remove "ladder fuels" by removing low tree branches, removing or pruning the shrubs under the tree.



Please Note: Tahoe Regional Planning Agency (TRPA) ordinances may need to be considered when implementing some of the Living With Fire recommendations. If a recommendation in this publication is followed by (TRPA), please refer to "TRPA AND DEFENSIBLE SPACE" on Page 18 for an explanation.



Lean, Clean, and Green Area: For a distance of at least 30 feet from the home, there should be a "Lean, Clean, and Green Area." "Lean" indicates that only a small amount of flammable vegetation, if any, is present within 30 feet of the house. "Clean" means there is little or no accumulation of dead vegetation or flammable debris within the area. "Green" requires that plants located within this area are kept healthy, green, and irrigated during fire season. For most homeowners, the Lean, Clean, and Green Area is the residential landscape. This area often has irrigation, contains ornamental plants, and is routinely maintained.

Noncombustible Area: Create a "Noncombustible Area" at least 5 feet wide around the base of your home. This area needs to have a very low potential for ignition from flying embers. Use irrigated herbaceous plants, such as lawn, ground cover, and flowers (TRPA); rock mulches; or hard surfaces such as concrete, brick, and pavers in this area (TRPA). Keep it free of woodpiles, wood mulches, dead plants, dried leaves and pine needles, flammable shrubs (such as juniper), and debris.

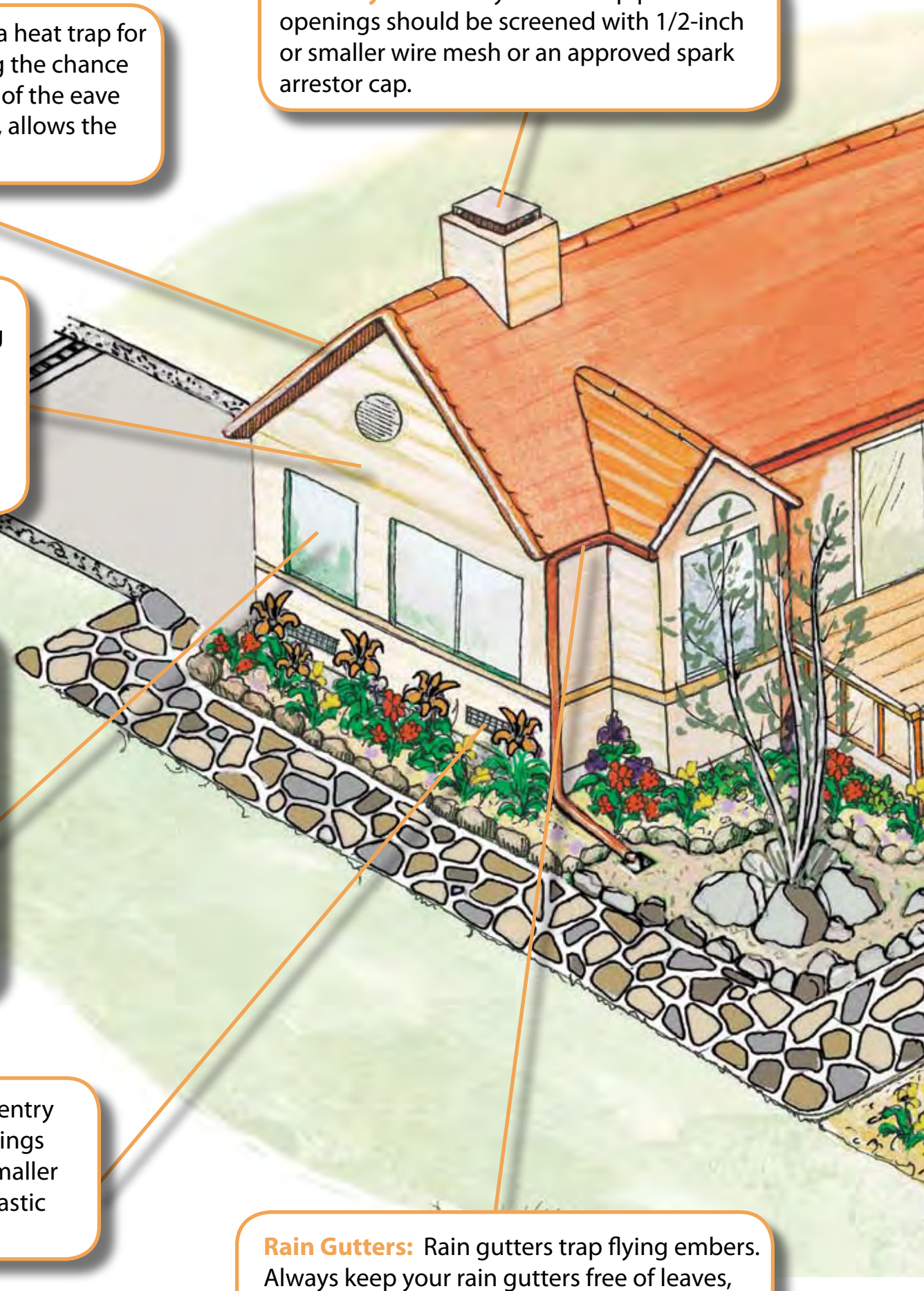
See Page 14, **Six Steps to Creating an Effective Defensible Space**

Built Zone

Eaves: The eaves of a home act as a heat trap for hot air and gases, greatly increasing the chance of ignition. Covering the underside of the eave with a soffit, or "boxing in" the eave, allows the heat to escape.

Chimneys: Chimney and stovepipe openings should be screened with 1/2-inch or smaller wire mesh or an approved spark arrestor cap.

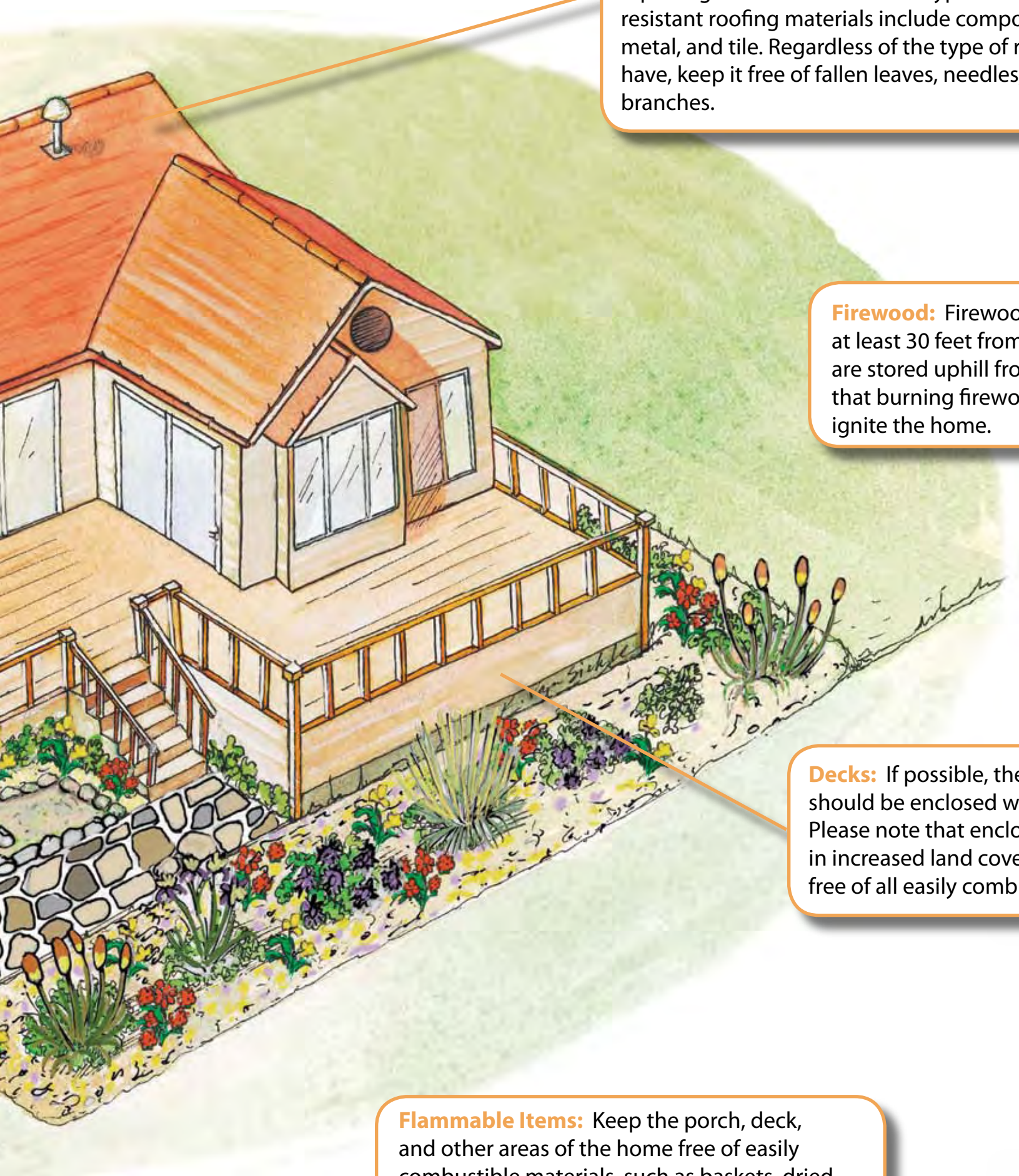
Exterior Siding: Wood products, such as boards, panels and shingles, are common siding materials. However, they are combustible and not good choices for fire-prone areas. Noncombustible siding materials, such as stucco, brick, and cement board, are better choices.



Windows: Windows are one of the weakest parts of a home and usually break before the structure ignites. This allows burning embers and heat to enter the home, which may lead to internal ignition. Single-paned and large windows are particularly vulnerable. In high fire hazard areas, install windows that are at least double-glazed or tempered glass. Windows with aluminum frames and sashes are better choices than those with wood or vinyl frames.

Vents: Vents on homes are potential entry points for flying embers. All vent openings need to be covered with 1/8-inch or smaller wire mesh. Do not use fiberglass or plastic mesh because they can melt or burn.

Rain Gutters: Rain gutters trap flying embers. Always keep your rain gutters free of leaves, needles, and debris. Check and clean them several times during fire season.



Roof: Homes with wood-shake or shingle roofs are much more likely to be destroyed during a wildfire than homes with fire-resistant roofs. If you have a wood-shake or shingle roof, consider replacing it with a fire-resistant type. Fire-resistant roofing materials include composition, metal, and tile. Regardless of the type of roof you have, keep it free of fallen leaves, needles, and branches.

Firewood: Firewood stacks should be located at least 30 feet from the home. If the stacks are stored uphill from the house, make sure that burning firewood cannot roll downhill and ignite the home.

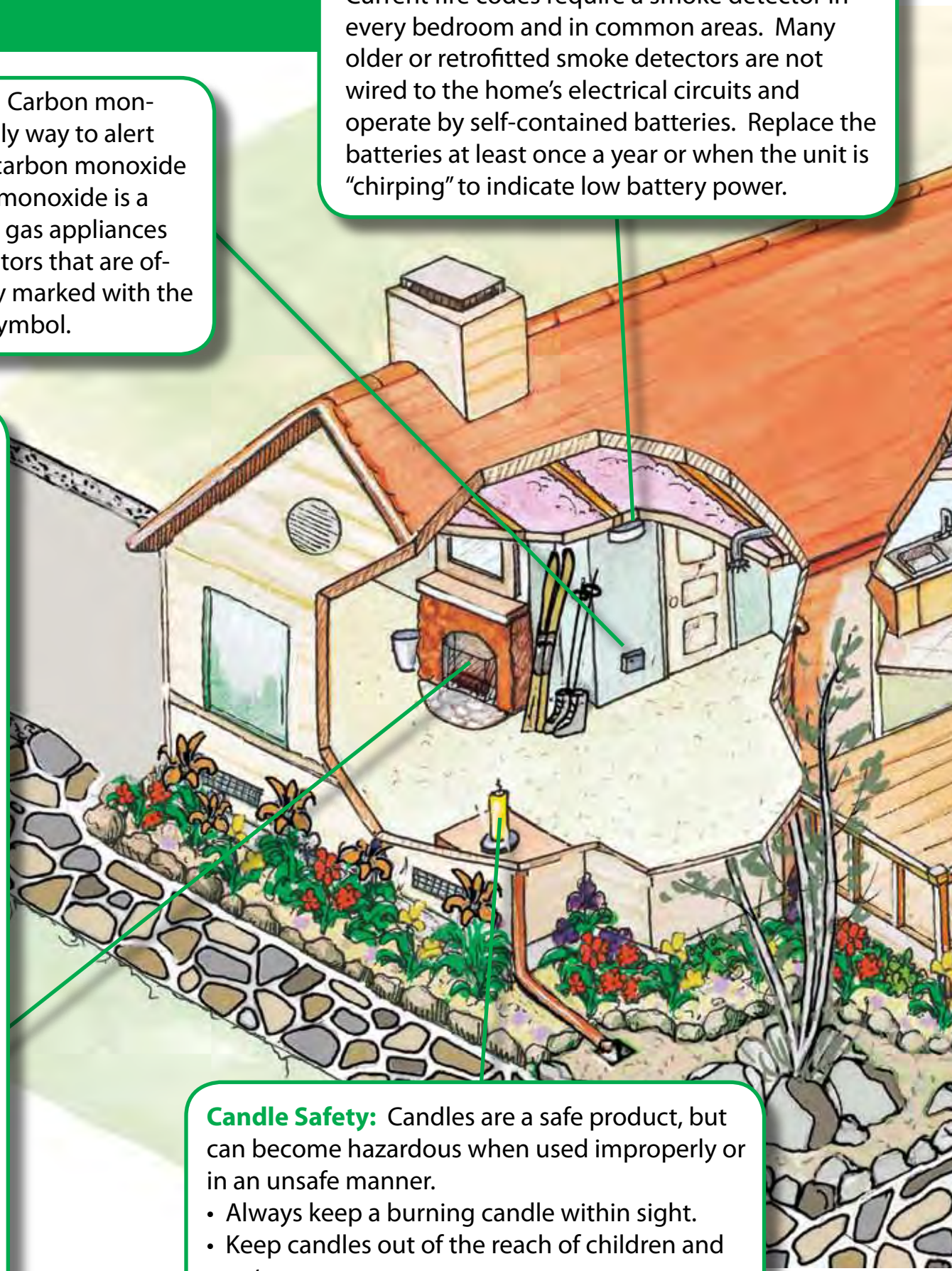
Decks: If possible, the underside of the deck should be enclosed with fire-resistant materials. Please note that enclosing the deck may result in increased land coverage (TRPA). Keep this area free of all easily combustible materials.

Flammable Items: Keep the porch, deck, and other areas of the home free of easily combustible materials, such as baskets, dried flower arrangements, newspapers, pine needles, and debris.

Interior Zone

Smoke Detectors: Smoke detectors are inexpensive devices that save many lives. Current fire codes require a smoke detector in every bedroom and in common areas. Many older or retrofitted smoke detectors are not wired to the home's electrical circuits and operate by self-contained batteries. Replace the batteries at least once a year or when the unit is "chirping" to indicate low battery power.

Carbon Monoxide Detectors: Carbon monoxide (CO) detectors are the only way to alert people to dangerous levels of carbon monoxide before tragedy strikes. Carbon monoxide is a byproduct of combustion from gas appliances or automobiles. Only use detectors that are officially approved and are clearly marked with the American Standard – UL2034 symbol.

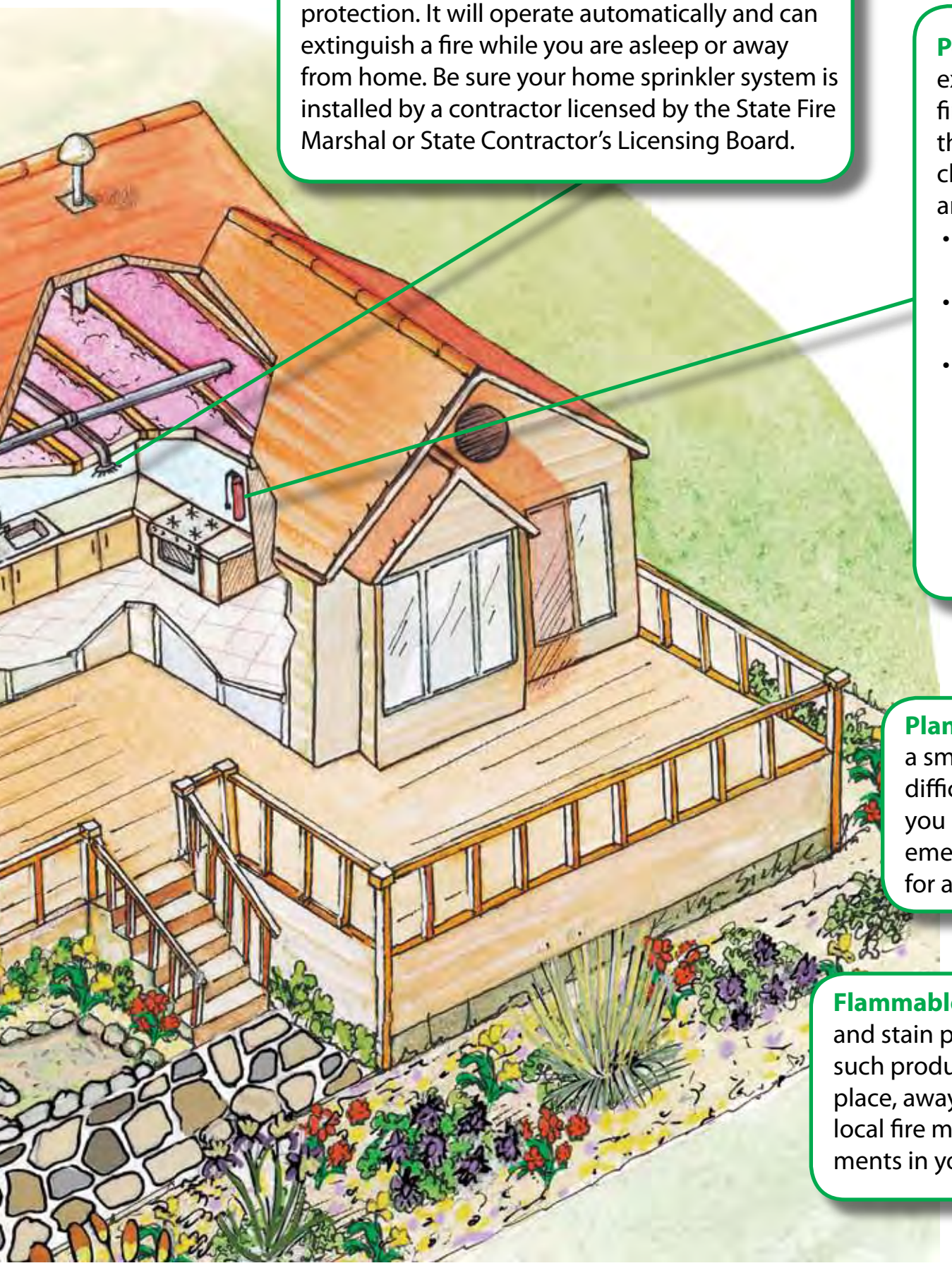


Wood Stove and Fireplaces: Heat your home safely by following these tips concerning wood stoves and fireplaces.

- Install according to the manufacturer's directions.
- Never use a flammable liquid such as gasoline to start a fire.
- Carefully follow directions when using synthetic logs.
- Keep a glass or metal screen in front of the fireplace opening to prevent embers or sparks from escaping.
- Keep flammable materials off the mantle and at least 3 feet away.
- Do not use excessive amounts of paper to start your fire.
- Do not burn colored paper, which can accelerate creosote buildup and increase the likelihood of a chimney fire.
- Avoid burning wood slowly for long periods of time, which contributes to soot and creosote buildup. Instead, allow the wood to burn rapidly for 10 to 15 minutes several times a week to help reduce creosote buildup. Use dry wood for more efficient burning.
- Dispose of ash properly. Regularly remove ashes and place them in a metal container with a lid. Place the ash-filled container outdoors, away from combustible materials. Do not set the ash container on a wood surface, such as a deck, or other combustible material. Once ashes are cool, they can be spread into flower beds, gardens, or compost piles.
- Screen chimney and stovepipe openings with 1/2-inch or smaller noncombustible mesh or an approved spark arrestor cap.
- Inspect and clean chimney at least once a year.

Candle Safety: Candles are a safe product, but can become hazardous when used improperly or in an unsafe manner.

- Always keep a burning candle within sight.
- Keep candles out of the reach of children and pets.
- Before burning, trim wicks to 1/4-inch.
- Always use a heat-resistant, sturdy candleholder that is large enough to contain any melted wax.
- Keep burning candles away from drafts, vents, air currents, and easily combustible materials.
- Always burn candles in a well-ventilated room.
- Extinguish the flame when 2 inches of wax remains, or when 1/2-inch remains if in a container.
- Use a candle snuffer to extinguish candles.



Sprinkler Systems: A sprinkler system installed inside the home can provide effective fire protection. It will operate automatically and can extinguish a fire while you are asleep or away from home. Be sure your home sprinkler system is installed by a contractor licensed by the State Fire Marshal or State Contractor's Licensing Board.

Portable Fire Extinguishers: Portable fire extinguishers enable you to quickly respond to a fire. Extinguishers are rated by the type of fire they can effectively extinguish: "A" – wood or cloth fires, "B" – liquid fires, "C" – electrical fires, and "D" – metal fires.

- Be sure all family members know the extinguisher's location and its operation.
- Get the extinguisher serviced annually and recharged after each use.
- The term P-A-S-S will help you remember the right way to use the extinguisher:

  Pull the safety pin
  Aim the extinguisher
  Squeeze the trigger
  Sweep the extinguisher at the base of the fire

Plan Your Escape: Even with early warning from a smoke detector, escaping a house fire can be difficult. By planning and practicing exit drills, you can better prepare your family for a fire emergency. Contact your local fire department for advice.

Flammable Paint and Stain Products: Paint and stain products are hazardous materials. All such products should be stored in a cool, dry place, away from any heat source. Contact the local fire marshal for specific disposal requirements in your area.

Other Heating Systems: Kerosene and other fuel-fired heaters should be used properly. Follow manufacturers' instructions when using these devices.

- Be sure they are approved by an independent testing laboratory. Heaters should turn off if accidentally tipped over.
- Use only the fuels specified by the manufacturer for each particular heating appliance.
- Refuel heaters outdoors.
- Keep children away from heaters.
- Never burn charcoal indoors.

Six Steps to Creating an Effective Defensible Space

Photo courtesy of John Cobourn

Through proper planning, an effective defensible space can be attractive and control soil erosion.

The term "defensible space" refers to the area between a house and an oncoming wildfire where the vegetation has been managed to reduce the wildfire threat and allow firefighters to safely defend the house. In the event that firefighters are not available, defensible space also improves the likelihood of a home surviving without assistance.

Unfortunately, when some homeowners hear the term "defensible space," they envision a large expanse of bare ground surrounding their home. While this is certainly effective at increasing home survivability, it is unacceptable for aesthetic reasons and can contribute to soil erosion. It is also unnecessary.

Soil erosion is of particular concern in the Lake Tahoe Basin. When properly implemented, defensible space practices should not result in an increase in bare ground or contribute to soil erosion.

Photo courtesy of Mike Dannenberg

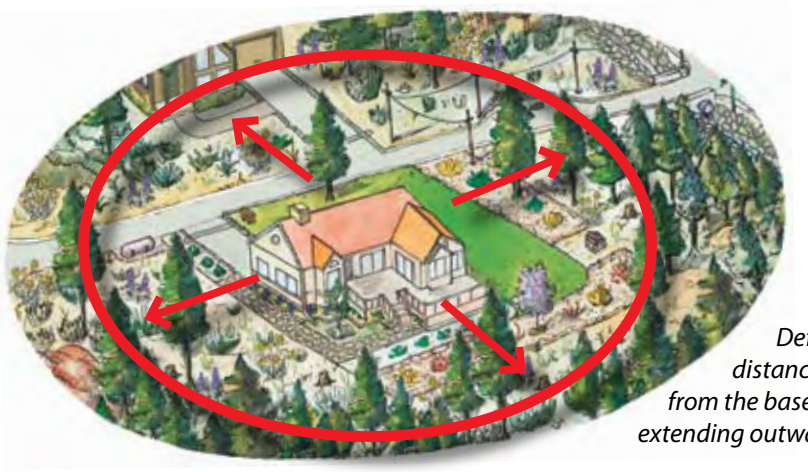
Make your house safe for firefighters to defend.

Step One

Determine the size of an effective defensible space: The size of the defensible space is usually expressed as a distance extending outward from the house in all directions. The recommended distance is not the same for every home. It varies depending on the dominant vegetation surrounding the home and steepness of slope. Use the Recommended Defensible Space Distance table to determine the right size for your home.

Once the recommended distance for defensible space is known, mark it by tying strips of cloth or flagging to shrubs. This becomes the "Defensible Space Zone."

If the Defensible Space Zone exceeds your property boundaries, seek permission from adjacent landowners before doing work on their property (TRPA). It is important to note that the effectiveness of the Defensible Space Zone improves when entire neighborhoods implement defensible space practices.



Defensible space distance is measured from the base of the house, extending outward.

Recommended Defensible Space Distance

	Flat to Gently Sloping 0-20%	Moderately Steep 21-40%	Very Steep +40%
Grass Dry grass and weeds	30 feet	100 feet	100 feet
Shrubs and Woodland Sagebrush, manzanita, and mountain mahogany	100 feet	200 feet	200 feet
Trees Forest trees, such as fir and pine. If there's a substantial shrub understory, use those values stated above.	100 feet	100 feet	200 feet

Step Two

Remove dead vegetation: For the most part, dead vegetation should be removed from the Defensible Space Zone. Two possible exceptions are fallen pine needles covering bare soil and downed trees embedded into ground.

Dead vegetation includes:

- dead and dying standing trees or recently fallen trees
- dead native and ornamental shrubs
- dead branches
- dried grass, weeds, and flowers
- dead pine needles still attached to trees, draped on live plants, on the roof or in rain gutters, or on the ground within 30 feet of the house (unless covering bare soil). See "The Great Pine Needle Debate" on Page 18 for recommendations on pine needle management. Downed trees that are embedded into the soil should be left in place, but have their exposed branches removed.

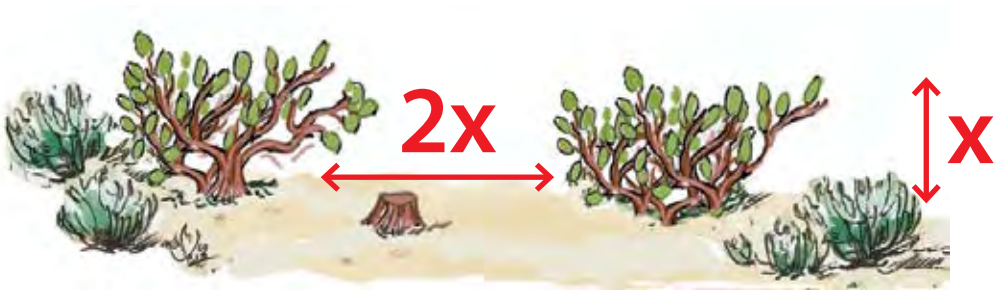
Remove all dead trees from within the Defensible Space Zone.

Step Three

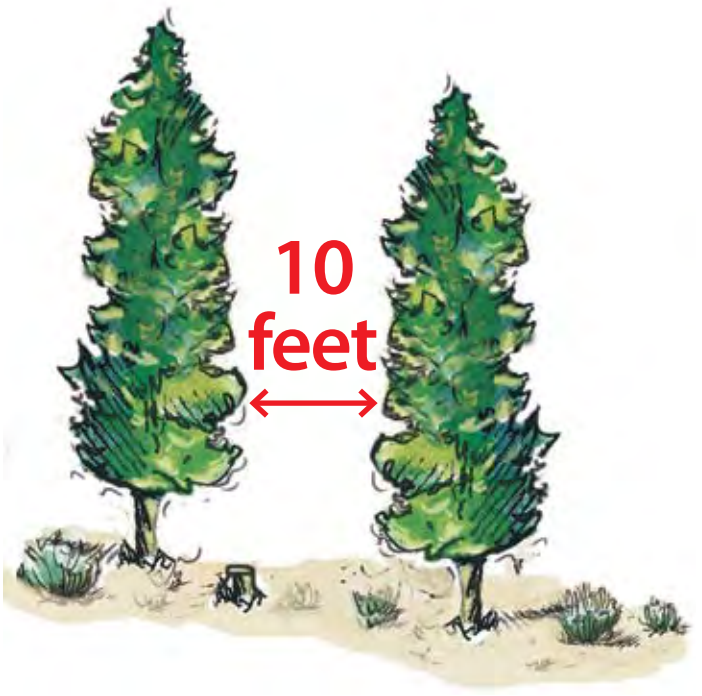
Create a separation between trees and shrubs: Within the Defensible Space Zone, native trees and shrubs, such as Jeffrey pine, white fir, and manzanita should not occur in a dense stand. Dense stands of trees and shrubs pose a significant wildfire threat. Thin dense tree and shrub stands to create more space between them.

Dense shrub fields pose a significant fire threat.

Photos courtesy of Jennifer Arrowsmith



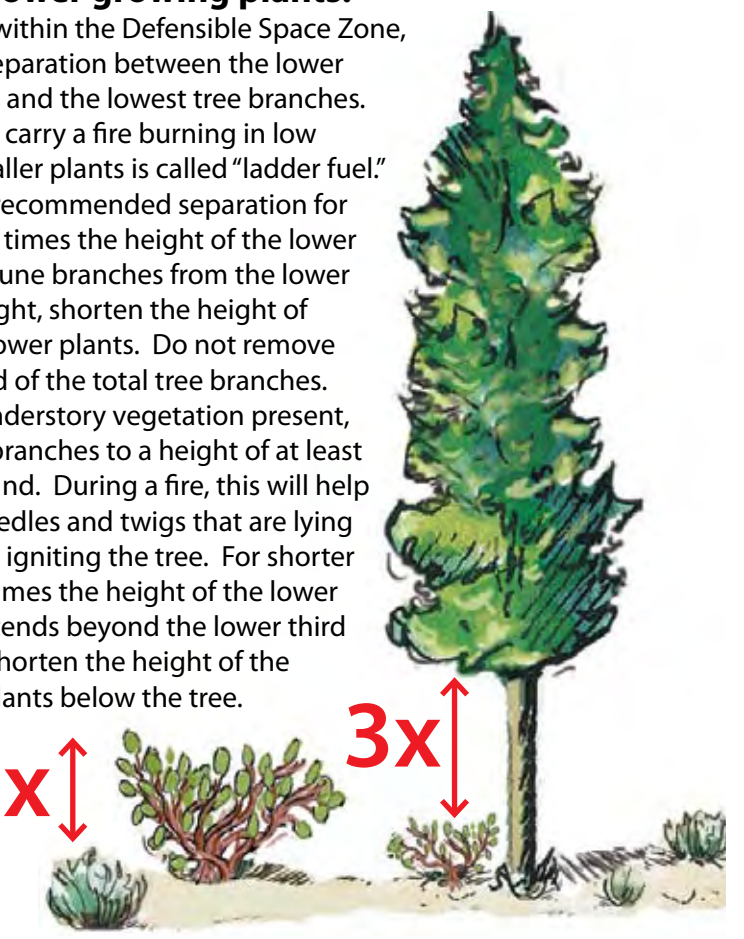
Sagebrush, Manzanita, Huckleberry Oak, Other Shrubs: On flat to gently sloping terrain, individual shrubs or small clumps of shrubs within the Defensible Space Zone should be separated from one another by at least twice the height of the average shrub. For homes located on steeper slopes, the separation distance should be greater. For example, if the typical shrub height is 2 feet, then there should be a separation between shrub branches of at least 4 feet. Remove shrubs or prune to reduce their height and/or diameter.



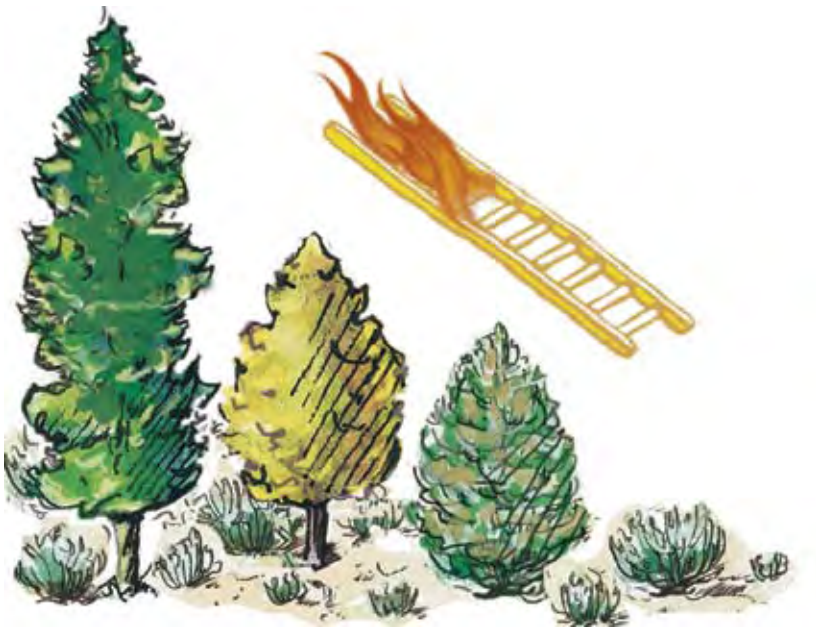
Forest Trees: On flat to gently sloping terrain, trees should be thinned to provide an average separation between the canopies of at least 10 feet (TRPA). For homes located on steeper slopes, the separation distance should be greater. Stumps should be cut flush to the ground for trees less than 6 inches in diameter at breast height, and to within 6 inches of the ground for larger trees. The stump's cut surface should be coated with powdered borax to retard the spread of root diseases. When selecting trees for removal, consider cutting unhealthy, damaged, or weak trees. Retain less common species of trees, such as incense cedar, sugar pine, and western juniper, if possible.

Step Four

Create a separation between tree branches and lower growing plants: If trees are present within the Defensible Space Zone, there should be a separation between the lower growing vegetation and the lowest tree branches. Vegetation that can carry a fire burning in low growing plants to taller plants is called "ladder fuel." For large trees, the recommended separation for ladder fuels is three times the height of the lower vegetation layer. Prune branches from the lower third of the tree height, shorten the height of shrubs, or remove lower plants. Do not remove more than one-third of the total tree branches. When there is no understory vegetation present, remove lower tree branches to a height of at least five feet above ground. During a fire, this will help prevent burning needles and twigs that are lying on the ground from igniting the tree. For shorter trees, where three times the height of the lower vegetation layer extends beyond the lower third of the tree height, shorten the height of the shrubs or remove plants below the tree.



Remove ladder fuels to a height of 5 feet when no understory vegetation is present.



Step Five

Create a Lean, Clean, and Green Area extending at least 30 feet from the house: There are two goals for the Lean, Clean, and Green Area. The first goal is to eliminate easily ignitable fuels, or "kindling," near the house. This will help prevent embers from starting a fire in your yard. The second goal is to keep fire intensity low if it does ignite near the house. By proper management of the vegetation and other fuels near the house, a fire would not be able to generate enough heat to ignite the home.

For most homeowners, the Lean, Clean, and Green Area is also the residential landscape. This area often has irrigation, is planted with ornamental vegetation, and is regularly maintained.

Lean, Clean, and Green Area Tips

- Remove most or all flammable wildland plants, including big sagebrush, bitterbrush, rabbitbrush, huckleberry oak, snowbrush, and manzanita. If you wish to retain a few of these as specimen plants, make sure they are free of dead wood and leaves, pruned to reduce the amount of fuel, and separated from adjacent brush fields. If bare ground results, consider spreading a thin layer of wood chips or planting conservation grasses.
- Retain wildland ground covers, such as pinemat manzanita and mahala mat, and wildflowers.
- Select less flammable plants for the home landscape (TRPA). Some rules of thumb in selecting landscape plants for the Lean, Clean, and Green Area are...
  - Shorter plants, less than 2 feet tall, are better choices than taller plants.
  - When green, herbaceous plants, such as grass and nonwoody flowers, are better choices than shrubs and trees.
  - Deciduous shrubs and trees are better choices than evergreen types. Avoid planting juniper, mugo pine and arborvitae.
- Emphasize the use of hard surfaces (TRPA) and mulches. Hard surfaces include materials such as concrete, asphalt, and brick. Mulches include rock and wood types. Wood mulches should not be used within 5 feet of the house.
- Clear all flammable vegetation from within 10 feet of the propane tank.
- Remove tree limbs that are within 10 feet of the chimney, touching the house or deck, within 6 feet of the roof, or encroaching on power lines.
- Create a noncombustible area at least 5 feet wide around the base of the house. Emphasize the use of irrigated herbaceous plants, such as lawn, ground covers, and flowers (TRPA). Also use rock mulches and hard surfaces (TRPA).

The Importance of the Lean, Clean, and Green Area…

Photo courtesy of Jack Cohen

Cerro Grande Fire, Los Alamos, New Mexico 2000 — 235 homes destroyed
"My examination suggests that the abundance and ubiquity of pine needles, dead leaves, cured vegetation, flammable shrubs, wood piles, etc. adjacent to, touching and or covering the homes principally contributed to the residential losses."

"Investigation of the Cerro Grande Fire"
Dr. Jack Cohen

Southern California Fires of 2003 — 3340 homes destroyed and 23 lives lost
"Ornamental vegetation created an unpredictable and significant fuel source that blew into attic vents and eaves and spread through neighborhoods by torching, crowning, or throwing embers. Structures became involved from ember attack from the inside out rather than flame impingement."

"Southern California Firestorm 2003"
Report for the Wildfire Lessons Learned Center

Oakland Hills Fire, California 1991 — 2449 homes destroyed and 25 lives lost
"The juniper and cedar are mostly present as ornamental vegetation around many homes. A dry-climate species, the juniper also ignites easily and burns intensely. Cedars are similar. Placement of these and other ornamental vegetation adjacent to combustible portions of the homes was a significant ignition scenario in this fire."

"Oakland Berkeley Hills Fire"
National Fire Protection Association

Conservation grasses and wildflowers are good choices for the Lean, Clean, and Green Area. When dry, they should be mowed.

During a wildfire, airborne embers may land and accumulate in the area next to the house. Avoid using combustible materials, such as wood mulch, and flammable plants, such as juniper, within 5 feet of the home.

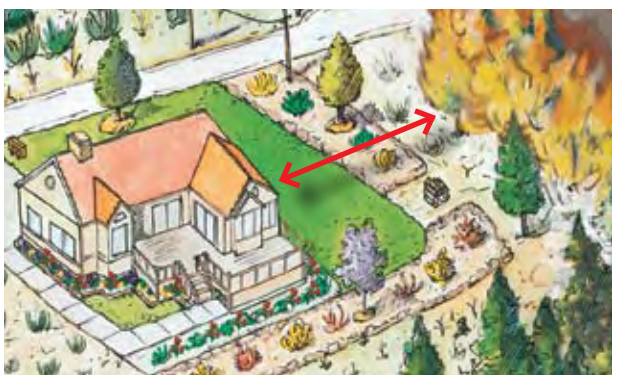
Step Six

Maintain the Defensible Space Zone: Maintaining a defensible space is an ongoing activity. Plants grow back and flammable vegetation needs to be routinely removed and disposed of properly. Before each fire season, reevaluate your property using the previous five steps and implement the necessary defensible space recommendations.

Little Green Gas Cans

Firefighters often refer to ornamental junipers as "little green gas cans." During a wildfire involving homes, embers can smolder undetected under ornamental junipers. The junipers can then ignite and burn intensely after firefighters have left your property. Planting ornamental junipers next to your house is never a good idea. Keep these "little green gas cans" at least 30 feet from the house or replace them with low-growing deciduous shrubs, herbaceous flowers, rock mulches, and hard surfaces.

FREQUENTLY ASKED QUESTIONS ABOUT DEFENSIBLE SPACE



WHAT IS DEFENSIBLE SPACE?
Defensible space is the area between a house and an oncoming wildfire where the vegetation has been modified to reduce the wildfire threat and to provide an opportunity for firefighters to effectively defend the house. Sometimes, a defensible space is simply a homeowner's properly maintained backyard.

WHAT IS THE RELATIONSHIP BETWEEN VEGETATION AND WILDFIRE THREAT?
Many people do not view the plants growing on their property as a threat. But in terms of wildfire, the vegetation adjacent to their homes can have considerable influence upon the survivability of their houses. All vegetation, including plants native to the area and ornamental plants, is potential wildfire fuel. If vegetation is properly modified and maintained, a wildfire can be slowed, the length of flames shortened, and the amount of heat reduced, all of which assist firefighters in defending the home against an oncoming wildfire.

Photo courtesy of Mike Dannenberg

THE FIRE DEPARTMENT IS SUPPOSED TO PROTECT MY HOUSE, SO WHY BOTHER WITH DEFENSIBLE SPACE?
Some individuals incorrectly assume that a fire engine will be parked in their driveway and firefighters will be actively defending their homes if a wildfire approaches. During a major wildfire, it is unlikely there will be enough firefighting resources available to defend every home. In these instances, firefighters will likely select homes they can most safely and effectively protect. Even with adequate resources, some wildfires may be so intense that there may be little that firefighters can do to prevent a house from burning. The key is to reduce fire intensity as wildfire nears the house. This can be accomplished by reducing the amount of flammable vegetation surrounding a home. Consequently, ***the most important person in protecting a house from wildfire is not a firefighter, but the property owner.*** And it is the action taken by the owner ***before*** the wildfire occurs (such as proper landscaping) that is most critical.

DOES DEFENSIBLE SPACE REQUIRE A LOT OF BARE GROUND IN MY LANDSCAPE?
No. Unfortunately, many people have this misconception. While bare ground is certainly effective in reducing the wildfire threat, it is unnecessary and unacceptable due to appearance, soil erosion, and other reasons. Many homes have attractive, well-vegetated landscapes that also serve as effective defensible space. Furthermore, bare ground would contribute to Lake Tahoe's declining water quality.

DOES CREATING A DEFENSIBLE SPACE REQUIRE ANY SPECIAL SKILLS OR EQUIPMENT?
No. For the most part, creating a defensible space employs routine gardening and landscape maintenance practices, such as pruning, mowing, weeding, plant removal, appropriate plant selection, and irrigation. Equipment needed includes common tools such as a chain saw, a pruning saw, pruning shears, loppers, a weed-eater, a shovel, and a rake. A chipper, compost bin, or large rented trash dumpster may be useful in disposing of unwanted plant material.

www.strangecosmos.com

HOW BIG IS AN EFFECTIVE DEFENSIBLE SPACE?
Defensible space size is not the same for every home, but varies by slope and type of wildland vegetation growing near the house. See "Step One" on Page 14.

DOES DEFENSIBLE SPACE MAKE A DIFFERENCE?
Yes. Investigations of homes threatened by wildfire indicate that those with an effective defensible space are much more likely to survive a wildfire. Furthermore, homes with both an effective defensible space and a nonflammable roof (composition shingles, tile, metal, etc.) are many times more likely to survive a wildfire. Defensible space also allows firefighters to effectively and safely defend your home.

DOES HAVING A DEFENSIBLE SPACE GUARANTEE MY HOUSE WILL SURVIVE A WILDFIRE?
No. Under extreme conditions, almost any house can burn. However, having a defensible space will significantly improve the odds of your home surviving a wildfire.

WHY DOESN'T EVERYONE LIVING IN A HIGH FIRE HAZARD AREA CREATE A DEFENSIBLE SPACE?
The specific reasons for not creating a defensible space are varied. Presented below are responses to common excuses for not creating defensible space.

What's your excuse?

"I don't have the time or money": If you live in a high fire hazard area, creating defensible space needs to be a high priority use of your spare time. Many defensible space activities require little or no money to implement. For bigger, more expensive tasks, consider forming a Nevada Fire Safe Council chapter for assistance in acquiring grant funds.

"It's wrong to cut trees": In many areas of the Lake Tahoe Basin, forest trees occur in unnaturally dense stands. Thinning of these thick stands of trees not only reduces the fire threat, but often promotes forest health.

"It won't look good": There is a misconception that defensible space has to be ugly and barren to be effective. Through proper planning, a homeowner can have both an attractive landscape and an effective defensible space.

"It's not my responsibility": The manner in which a house is built, characteristics of the adjacent vegetation, and maintenance often determine survivability during wildfire. The homeowner, not the firefighter, is usually responsible for these factors.

"I don't have an easy way to dispose of the unwanted vegetation": Check to see if there is a free community cleanup day in your area, ask your fire marshal if they have a fuels reduction chipping program, or join several other neighbors and rent a chipper and trailer for a weekend.

"It's not going to happen to me": The Lake Tahoe Basin has all the ingredients necessary for wildfire. All that is lacking is an ignition on a hot, dry, windy day.

"TRPA won't allow it": In most cases, the creation of defensible space is compatible with TRPA ordinances. See "TRPA AND DEFENSIBLE SPACE" on Page 18 for details.

"I've got insurance": While insurance can rebuild a house, it cannot recreate a home. Photo albums, heirlooms, and other memorabilia are often irreplaceable.

"I don't know what to do": For more information about creating defensible space, go to www.livingwithfire.info or contact your local firefighting agency or University of Nevada Cooperative Extension office.

TRPA AND DEFENSIBLE SPACE

Contrary to popular belief, a homeowner can have an effective defensible space and still be in compliance with the TRPA Code of Ordinances. There are several instances where you may need TRPA consultation, approval, or permit.

Tree Removal	Cutting of live trees with trunks greater than 6 inches in diameter requires a TRPA permit. Permits can also be obtained from the Nevada Division of Forestry and California Department of Forestry and Fire Protection.
Plant Selection	Plants being used in areas other than borders, entryways, flower beds, and similar locations are to be selected from the TRPA Recommended Plant List.
Hard Surfaces	Land coverage standards may apply when increasing the amount of hard surfaces and a permit may be required.
Enclosing Decks	Enclosing the underside of the deck may increase the amount of land coverage for your property and require a permit.
Defensible Space Zone	If the Defensible Space Zone includes TRPA-designated sensitive areas, additional considerations apply. Sensitive lands include stream environment zones, lakeshores, scenic areas, and conservation/ recreation areas.

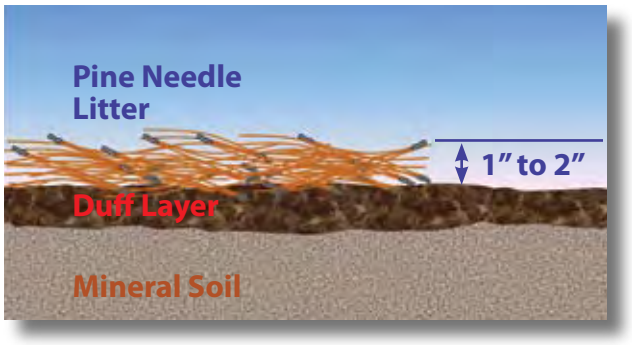
For more information, contact TRPA at (775) 588-4547 or visit www.trpa.org.

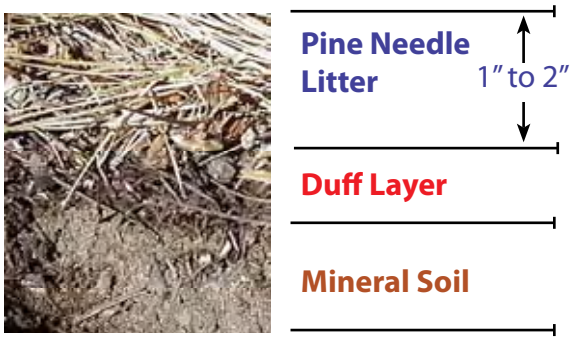
The Great Pine Needle Debate

Pro: Fallen pine needles often serve as an important natural mulch, protecting bare soil from erosion. Fallen pine needles should be left in place.

Con: Dried, fallen pine needles are one of the most easily ignitable materials in Tahoe's forests. Fallen pine needles should be removed.

Compromise: In areas where dead pine needles are present, but are not covering bare soil, remove them. This includes dead needles that are still attached to trees; draped on live plants; lying on the roof or deck; covering lawn and mulches; or lying on hard surfaces, such as sidewalks, patios, and driveways. In areas where fallen needles are covering bare soil, use the following recommendations. Within 5 feet of the house and deck, remove all dead pine needles. For the area that lies 5 feet to at least 30 feet from the house and deck, maintain pine needles at a depth of 1 to 2 inches. Take care to avoid disturbing the "duff layer" if present, the dark area at the ground surface where needles are decomposing.



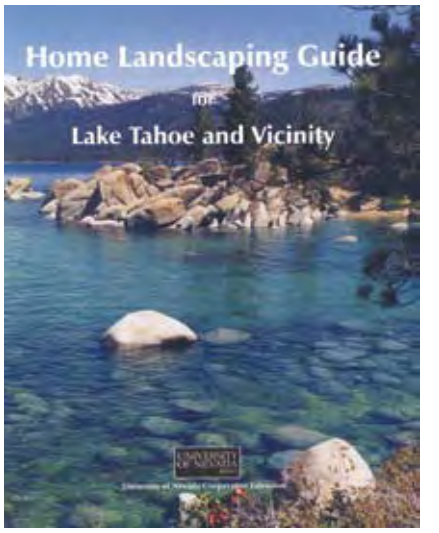


An accummulation of pine needles in rain gutters is a fire hazard. Clean out rain gutters at the start of the fire season.

For more information about pine needle management in the Lake Tahoe Basin, contact your Conservation District office in California (530) 543-1501 or in Nevada (775) 586-1610. You can also call University of Nevada Cooperative Extension (775) 832-4150.

Controlling Erosion

When creating defensible space, be aware of Lake Tahoe water quality concerns. If misapplied, defensible space practices could encourage accelerated erosion, a major contributor to the lake's declining clarity. Consider the following concepts when creating defensible space:



- Do not remove all vegetation from the defensible space area.
- If defensible space practices result in bare ground, cover the disturbed area with a thin layer (less than 2 inches) of wood chips or revegetate with conservation grasses and wildflowers.
- Do not dig out plant roots. Leave them in place.
- When breaking up dense brush fields on steep slopes, create islands of shrubs staggered horizontally across the slope.
- Implement Best Management Practices (BMPs) on your property. BMPs are measures that help slow water runoff and control soil erosion. For a free BMP inspection of your property, contact the Conservation District in California (530) 543-1501 Ext. 6 or in Nevada (775) 586-1610 Ext. 28.

For more information about defensible space, erosion control, and general landscape management, call University of Nevada Cooperative Extension at (775) 832-4150 and request a copy of "Home Landscaping Guide for Lake Tahoe and Vicinity."

The Nevada Fire Safe Council

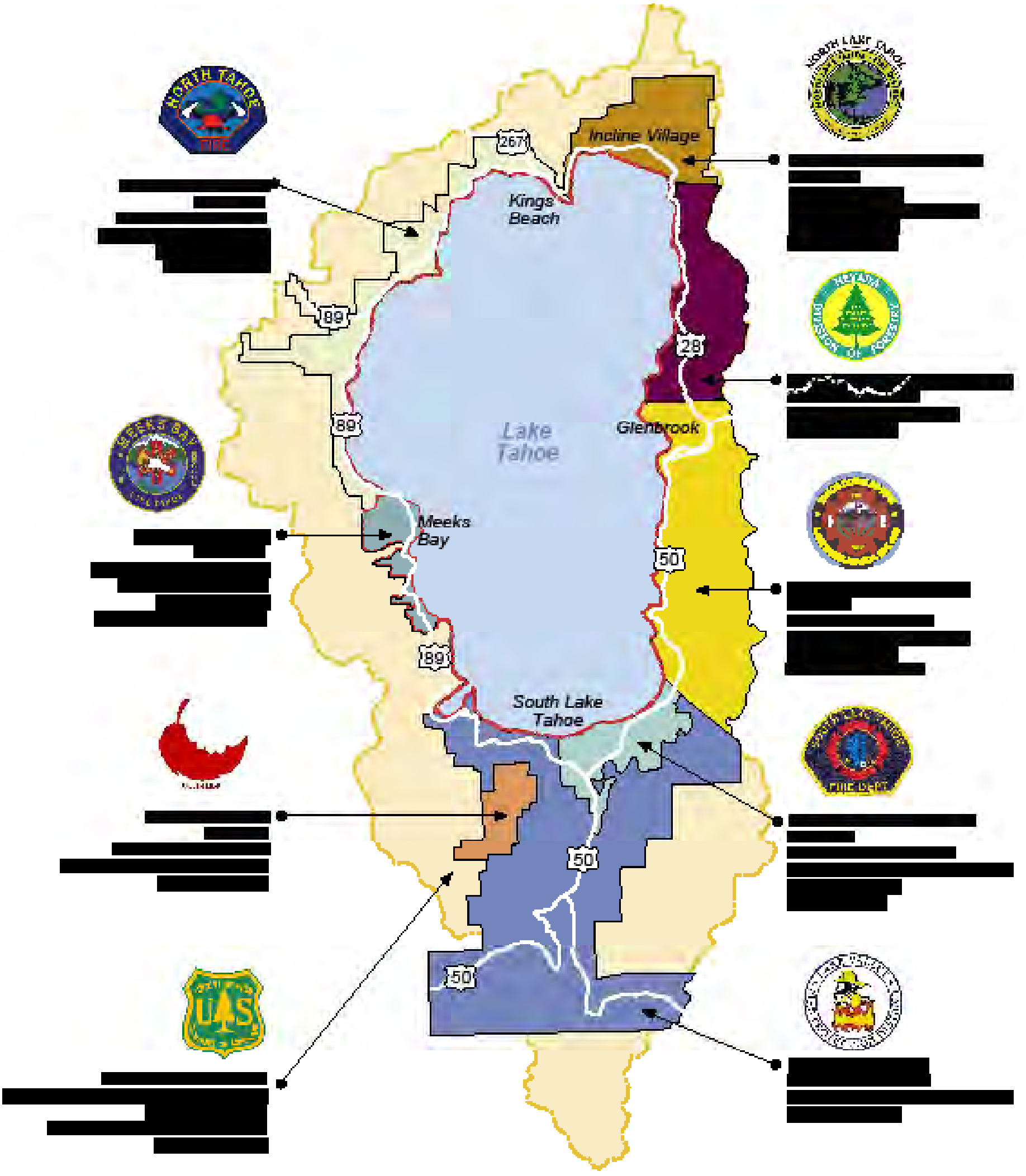
Tahoe Basin Region

The Nevada Fire Safe Council (NFSC) is a non-profit organization that assists high fire hazard communities in wildfire threat reduction. Specifically, the purpose of NFSC is to:

- Improve residents understanding of the fire threat and encourage personal responsibility for some level of community protection,
- Identify and rate the wildfire risks and hazards,
- Develop and prioritize wildfire threat reduction projects, and
- Obtain funding to implement wildfire mitigation measures.

The NFSC accomplishes its mission through an elected Board of Directors and locally formed Fire Safe Council chapters. For information on how your Lake Tahoe Basin community can become a NFSC chapter, call (530) 573-0515 or e-mail tahoefiresafe@yahoo.com. Interested individuals can also visit www.nvfsc.org.

Lake Tahoe Basin Fire Protection Agencies



If Wildfire Approaches . . .

Photo courtesy of Nevada Appeal

What should I wear and have with me?

Wear only cotton or wool clothes
Proper attire includes long pants, long-sleeved shirt or jacket, and boots
Carry gloves, a handkerchief to cover your face, water to drink, and goggles
Keep a flashlight and portable radio with you at all times
Tune in to a local radio station and listen for instructions

What about family members and pets?

If possible, evacuate all family members not essential to preparing the house for wildfire
Make sure to designate a safe meeting place and contact person
Relay your plans to the contact person
Evacuate pets
Contact the local Humane Society for pet assistance if needed

How should I prepare my car?

Place vehicles in the garage, pointing out with keys in the ignition
Roll up the windows
Close the garage door, but leave it unlocked
If applicable, disconnect the electric garage door opener so that the door can be opened manually

What should I take?

Important documents (bank, IRS, trust, investment, insurance policy, birth certificates, medical records)
Credit and ATM cards
Medications
Prescription glasses
Driver's license
Passport
Computer backup files
Inventory of home contents (consider videotaping)
Photograph the exterior of the house and landscape
Address book
Cell phone and charger
Personal toiletries
Change of clothing
Family photo albums and videos
Family heirlooms
Place essential items in the car

How should I leave my home?

Close all interior doors
Leave a light on in each room

Photo courtesy of Seth Meyer

Be prepared! It will likely be dark, smoky, windy and hot. There may be airborne embers, no power, no telephone service, and poor water pressure.

Remove lightweight, nonfire-resistant curtains and other combustible materials from around windows
Close fire-resistant drapes, shutters, and Venetian blinds
Turn off all pilot lights
Move overstuffed furniture, such as couches and easy chairs, to the center of the room

What about the outside of my home?

Place combustible patio furniture in the house or garage
Shut off propane at the tank or natural gas at the meter
Close all exterior vents if possible
Prop a ladder against the house to provide firefighters with access to the roof
Make sure that all garden hoses are connected to faucets and attach nozzles set on "spray"
Close all exterior doors and windows
Leave exterior doors unlocked
Turn on outside lights
If available and if there's time, cover windows, attic openings, and vents with plywood that is at least one-half inch thick
Wet down wood-shake or shingle roofs before leaving
Fill trash cans and buckets with water and place where firefighters can find them
If you have an emergency water source (pool, pond, etc.) and/or portable pump, clearly mark its availability so it can be seen from the street

For more information, visit our Web site
www.livingwithfire.info

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Bureau of Land Management is a federal land management agency and is Nevada's largest wildland firefighting organization. Visit www.nv.blm.gov.

Nevada Division of Forestry is a state agency that provides crucial firefighting resources throughout Nevada and is an important manager of Nevada's natural resources located on private and state lands. Visit www.forestry.nv.gov.

Sierra Front Wildfire Cooperators is a collaborative effort of western Nevada's and eastern California's local, state, and federal firefighting agencies. Contact Ronna Hubbard, (775) 885-6137.

USDA Forest Service provides numerous wildland firefighting resources across the state on National Forest lands. Visit www.fs.fed.us.

University of Nevada Cooperative Extension is a federal, state and county partnership that develops educational programs in response to Nevada's important issues. They are responsible for managing the *Living With Fire* program. For information about other Cooperative Extension programs, visit www.unce.unr.edu.

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For more information about *Living With Fire*, contact Ed Smith, (775)782-9960 or smithe@unce.unr.edu; or Sonya Sistare, (775)784-4848 or sistares@unce.unr.edu.

A master CD is available to agencies who wish to create a customized version of this publication by registering at www.livingwithfire.info.

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